

WHAT IS CLAIMED IS:

1. A method for fabricating a semiconductor device comprising the steps of:

5 sequentially depositing an inorganic silicon oxide layer on a substrate and an organic silicon oxide layer of a low dielectric constant on the inorganic silicon oxide layer;

forming a partial trench with a predetermined depth in the organic silicon oxide layer by patterning;

10 oxygenating an inner wall of the partial trench; and

forming a trench by etching the partial trench with hydrofluoric acid (HF).

2. The method of claim 1, the method further comprising
15 the steps of:

depositing a conductive layer to fill the trench; and

removing a portion of the conductive layer stacked on a top surface of the organic silicon oxide layer by chemical-mechanical polishing (CMP).

20 3. The method of claim 1, the method further comprising the steps of:

forming a photo resist pattern exposing a predetermined portion of a bottom of the trench after the step of forming the trench; and

25 forming a contact hole by etching the inorganic silicon oxide

layer with the photo resist pattern.

4. The method of claim 1, wherein the oxygenation is performed in an ashing step for the photo resist pattern formed during the patterning step.

5. The method of claim 1, wherein the oxygenation is performed at a region having a thickness less than 1000 Å in an exposed region of the organic silicon oxide layer.

6. The method of claim 1, wherein the HF wet etching is performed in 5 seconds by a buffered oxide etchant (BOE).

7. A semiconductor device comprising:

a substrate having a conductive region formed thereon;

an inorganic silicon oxide layer formed on the substrate and converging at least a portion of a conductive region formed thereon;

an organic silicon oxide layer of a low dielectric constant formed on the inorganic silicon oxide layer;

a conductive interconnection formed with a predetermined line width in a depth of the same or more as a thickness of the organic silicon oxide layer; and

a contact plug penetrating the inorganic silicon oxide layer in a predetermined part for connecting electrically the conductive interconnection to the conductive region of the substrate.

8. The semiconductor device of claim 7, wherein the contact plug and the conductive interconnection are simultaneously formed in a manufacturing step.

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9. The semiconductor device of claim 8, wherein the contact plug and the conductive interconnection are made of copper.

10. The semiconductor device of claim 7, wherein the organic silicon oxide layer is a silicon oxi-carbonate (SiOC) layer of silsesquioxane series containing carbon.

11. The semiconductor device of claim 10, wherein the organic silicon oxide layer is formed by chemical vapor deposition (CVD).